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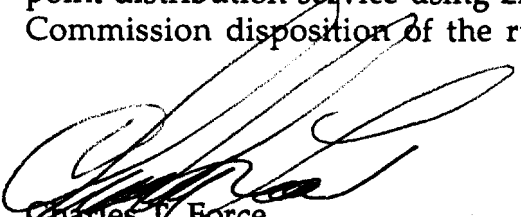
FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

Reply to Attn of: OI

Ms. Donna R. Searcy  
The Secretary, Office of Managing Director  
Federal Communications Commission  
Room 222  
Washington, DC 20554

SUBJECT: Reply Comments on the Federal Communications Commission  
(FCC) Document Number 92-297

Enclosed are the reply comments of the National Aeronautics and Space Administration to the notice of proposed rule making in FCC Document Number 92-297, to amend the Commission's rules to establish regulations for a local multi-point distribution service using 27.5-29.5 GHz. These comments should be used in Commission disposition of the rule-making initiative.



Charles T. Force  
Associate Administrator  
for Space Communications

Enclosure

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APR 15 1993

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

In the Matter of

Rulemaking to Amend Part 1 and Part 21  
of the Commission's Rules to Redesignate  
the 27.5 - 29.5 GHz Frequency Band and  
to Establish Rules and Policies for  
Local Multipoint Distribution Service

CC Docket No. 92-297

RM-7872; RM-7722

**REPLY COMMENTS OF THE  
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

Charles T. Force  
Associate Administrator for  
Space Communications  
National Aeronautics and Space  
Administration

April 15, 1993

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## **SUMMARY**

The comments demonstrate that the proposal to allocate the 27.5-29.5 GHz band to a new Local Multipoint Distribution Service ("LMDS") on a co-primary basis with the Fixed-Satellite Service ("FSS") is based on an incorrect premise, namely, that this band will remain unused by the FSS. The satellite community points out in the comments that the Ka-band has long been earmarked for expansion by the satellite industry and that, as anticipated, use of the band by the FSS is now beginning to emerge as the C-and Ku-bands become increasingly saturated.

Although near term satellite use of the band will be by NASA's Advanced Communications Technology Satellite ("ACTS"), the major proponent of LMDS, Suite 12 Group, misunderstands the long term significance of ACTS by focusing exclusively on its experimental status.

Since ACTS will pioneer the Ka-band technologies that commercial satellite systems will use in the future, the ultimate issue here is not ACTS, but future use of the Ka-band by the FSS. If the ACTS experiments are restricted in terms of the geographic areas in which they may take place and/or the frequencies they use, as suggested by Suite 12 Group, the value of the ACTS program will be severely diminished and the American people will be deprived of the return on its nearly \$1 billion investment in the ACTS program.

Further, in contrast to the substantial analyses undertaken by satellite interests, which show that sharing between the proposed LMDS and the FSS either does not appear to be feasible or is highly questionable, LMDS proponents have made no attempt to meet their burden of demonstrating the compatibility of the proposed new service with the FSS. Instead, the main proponent of LMDS, Suite 12 Group, attempts to divert focus from the incompatibility of LMDS with the FSS by raising a number of unmeritorious arguments to the effect that the FSS may not be able to use the Ka-band anyway.

The comments also show that the proposed LMDS allocation would threaten the ability of the FSS to meet the future needs of the U.S. satellite industry and could pose international coordination problems with Canada and Mexico. In addition, a number of diverse interests note that adopting an LMDS allocation at this time would be premature. This is consistent with NASA's request that the Commission defer for five years a decision on whether to allocate spectrum in the 28 GHz band for LMDS so that it can properly weigh the impact on the FSS in light of the results of the ACTS experiments.

Finally, if the Commission decides such a delay would not be in the public interest, then, given the countervailing needs of the FSS, the only reasonable course of action is to find alternative spectrum for LMDS. In NASA's view, it should be possible to find such spectrum if the spectrum requirements of LMDS are reduced. NASA believes that the number of channels which Suite 12 Group claims is necessary for a viable system could be provided in 500 MHz of spectrum or less by requiring LMDS operators to use currently available digital compression technology.

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In the Matter of	)	
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to Establish Rules and Policies for	)	
Local Multipoint Distribution Service	)	

REPLY COMMENTS OF THE  
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

The National Aeronautics and Space Administration ("NASA") hereby replies to the comments filed in response to the Commission's Notice of Proposed Rulemaking, Tentative Decision and Order on Reconsideration ("Notice") issued in the above-captioned proceeding.

I. Introduction

Although many comments were filed generally supporting the Commission's proposal to allocate the 27.5-29.5 GHz band to a new Local Multipoint Distribution Service ("LMDS") on a co-primary basis with the Fixed-Satellite Service ("FSS"), none of them come to grips with the most fundamental issue involved in this proceeding -- the compatibility, or lack thereof, between LMDS and the FSS. The proponents of LMDS attempt to sidestep this issue by noting that the band has not heretofore been used by the FSS in the U.S., by focusing on the fact that near term use of the band will be by NASA's experimental satellite system, and by claiming that the FSS will have difficulty using the band anyway. As explained below,

however, these arguments are misplaced and do not stand up to the compatibility studies that have been undertaken by satellite interests. As also explained below, it should be possible to accommodate LMDS in another band by reducing its spectrum requirements through the use of currently available digital compression technology.

II. The Comments Confirm that Ka-Band Has Long Been Earmarked For Future Growth by the U.S. Satellite Industry and that FSS Use of the Band Is Now Beginning to Emerge

While the satellite industry was silent on the Suite 12 Petition, an oversight that is in large part explained by Loral Qualcomm Satellite Services, Inc. ("LQSS")<sup>1</sup>, the comments filed in response to the Notice make clear that that silence does not reflect a lack of interest in the 28 GHz band. Indeed, satellite interests have indicated unequivocally in their comments that the Ka-band has long been earmarked for future growth by the satellite industry and that, as anticipated, use of the band by the FSS is now beginning to emerge as the C- and Ku-bands become increasingly saturated.

For example, Hughes Space and Communications Company and Hughes Network Systems, Inc. ("Hughes") observe:

Suite 12 Group has argued that the 27.5-29.5 GHz band has lain fallow for many years. However, this [is] precisely what was intended and expected in the short term for the FSS allocations at Ka band. These bands were intentionally allocated to accommodate the future growth of the FSS at such time as the FSS allocations at C and Ku bands become crowded. The

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<sup>1</sup> LQSS Comments at 8 (noting that many satellite entities, including NASA, were deeply involved in the WARC-92 preparatory process at the time the Suite 12 Petition was filed and that Suite 12 made no effort to participate in the WARC-92 preparatory process despite the fact that a number of Ka-band allocation matters were being considered).



present situation in the Ka band FSS allocations simply reflects the fact that the anticipated saturation of C and Ku band is not quite at hand in the United States. But European and Japanese satellite operators already are launching Ka band FSS systems. NASA has already invested almost a billion dollars in developing the ACTS technology for U.S. uses -- technology which is more innovative and spectrum efficient than the analog technology proposed by Suite 12 Group.<sup>2</sup>

Similarly, LQSS notes:

The 20/30 GHz band has long been viewed as the band of future satellite systems. That future is rapidly approaching, with 20/30 GHz systems already deployed in Japan and Western Europe and with a 20/30 GHz satellite system scheduled for deployment in the United States in the summer of 1993. Other satellite systems using the 20/30 GHz band have been licensed by the Commission or have applications pending.<sup>3</sup>

In fact, a number of the applicants for or proponents of these planned 20/30 GHz satellite systems filed comments in this proceeding, dispelling any question about the concreteness of the commercial satellite industry's plans for this band. See Comments of Motorola Satellite Communications, Inc. ("Motorola SatCom"), Norris Satellite Communications, Inc. ("Norris"), Calling Communications Corporation ("Calling Communications").

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<sup>2</sup> Comments of Hughes at 3.

<sup>3</sup> Comments of LQSS at 3. It should also be noted that Digital Microwave Corporation ("DMC") states that "while the availability of lower frequencies with better propagation characteristics may have limited the use of the 28 GHz band up to this point, the fixed microwave user environment is rapidly changing in ways that guarantee a substantial demand for the band in the foreseeable future.: Comments of DMC at 2.

Finally, the Mobile Satellite Service ("MSS") Above 1 GHz Negotiated Rulemaking Committee (the "NRC" or "Committee") completed its work earlier this month. Working Group 3 (Feeder and Intersatellite Links) of that Committee studied the need communications satellites would have for this band in the future. It stated in its Report that:

Although the FCC correctly noted in its LMDS NPRM that the 27.5-29.5 GHz band is not presently used for FSS transmissions, the allocation's current fallowness is fully consistent with what was envisioned when the spectrum was initially allocated to the FSS by the ITU. The Ka-band FSS allocations were intended essentially as an expansion band for future FSS services.

Ironically, the FCC's LMDS proposal was thrust upon the scene just as the contemplated FSS services are now beginning to materialize in increasing numbers. This Committee believes that FSS access to the full 2000 MHz at 27.5-29.5 GHz is already necessary to satisfy this increasing demand from commercial satellite operators.<sup>4</sup>

### III. Suite 12 Group Misunderstands the Long Term Significance of ACTS to the Commercial Satellite Industry By Focusing Solely on its Experimental Status

Although the 27.5-29.5 GHz band is allocated on a primary basis for FSS uplinks, and although it is clear that this band is essential for long term expansion of satellite communications services, it is true that the near term satellite use of the band will be by the Advanced Communications Technology Satellite ("ACTS"). However, this is no ordinary experimental program, as Suite 12 Group contends. As explained below, by focusing exclusively on the experimental status of ACTS and

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<sup>4</sup> The Report of Working Group 3 to the MSS Above 1 GHz Negotiated Rulemaking Committee - Annex 3 to MSS Above 1 GHz NRC Report, April 1, 1993, at 33-34.

ignoring its long term implications,<sup>5</sup> Suite 12 Group misses the point entirely.

First, the ultimate issue here, for all intents and purposes, is not ACTS, but future use of the Ka-band by the FSS. Thus, even if the Commission were to agree with Suite 12 Group that ACTS earth stations should not be afforded, and should be required to provide, interference protection vis-a-vis all regularly licensed stations, that would still not resolve the more fundamental issue of whether the future of the FSS should be sacrificed to accommodate another video distribution service, the need for which is questionable at best.

Second, notwithstanding this larger issue, the ACTS program is still extremely important in and of itself. As NASA explained in its initial comments, ACTS, which will be launched in July, will pioneer the Ka-band technologies that commercial satellite systems will use in the future. In so doing, ACTS will help bridge the "transition" from the lower FSS bands to Ka-band and, in the process, ensure that the U.S. maintains its world leadership in the satellite field. Indeed, the importance of ACTS is evidenced by the nearly \$1 billion which taxpayers have invested in this program. This, of course, does not include the untold millions of dollars in satellite industry jobs, capital investment, and services that the ACTS program will spawn.

Finally, given these important objectives, it would be short-sighted

Group's suggestion that ACTS be limited to sparsely populated rural areas and to the unshared portion of the Ka-band (i.e., 29.5-30.0 and 19.7-20.2 GHz) would defeat the purpose of ACTS.<sup>6</sup> In order for the ACTS program to achieve its objectives, ACTS earth stations must be able to operate in urban as well as rural areas, and on all of the frequencies which have been authorized for use by ACTS.

First, as NASA explained in its comments, VSAT networks will be deployed primarily in urban areas. Moreover, there is an initial group of ACTS experimenters who are located in a variety of communities, ranging from rural to metropolitan. Since future communications needs are likely to resemble current needs, it is expected that some future FSS user will reside in rural areas, while others will be in more populated areas. Excluding users in more populated areas from accessing ACTS and allowing only rural-to-rural communications would have disastrous effects on the entire program and its ability to demonstrate the range of services that would be available from an operational system.

If the ACTS experiments are restricted in terms of the geographic areas in which they may take place and/or the frequencies they use, the value of the program will be severely diminished and the American people will be deprived of their return on its investment in ACTS. Consequently, the satellite industry will not learn all it could from ACTS and certain Ka-band satellite technologies either will not be developed or will not be exploited as rapidly as would otherwise have been possible.

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<sup>6</sup> Comments of Suite 12 Group at 21-22.

IV. The Comments Filed By Satellite Interests Indicate that Sharing Between the Proposed LMDS and the FSS Either Is Not Feasible Or Appears to Be Highly Questionable

NASA explained in its initial comments why sharing between the FSS and LMDS does not appear to be feasible.<sup>7</sup> All of the satellite interests who filed comments, including both geostationary and non-geostationary

LMDS proponents made no attempt to demonstrate the feasibility of sharing between LMDS and the FSS prior to release of the Notice and, as discussed in more detail below, their comments continue to skirt this most fundamental of issues. In this connection, NASA agrees with Hughes that LMDS proponents bear the burden of demonstrating the feasibility of sharing and that "the proposed use of the frequencies proposed for LMDS use should not in any way foreclose the future use of another co-primary allocation, here the fixed satellite service."<sup>10</sup>

V. Suite 12 Group's Attempts to Shift Its Burden of Demonstrating the Feasibility of Sharing and to Divert Focus from the Incompatibility of LMDS with the FSS Are Without Merit

Rather than demonstrating that LMDS can co-exist with the FSS, Suite 12 Group argues that, for a number of reasons, the FSS may not be able to use the Ka-band anyway. None of these arguments withstands careful scrutiny.<sup>11</sup>

A. Contrary to Suite 12 Group's Claims, the FSS Is Able to Use the Ka-band Downlink Frequencies

Suite 12 Group argues that LMDS will not increase the difficulty of Ka-band sharing because such sharing is not feasible today in most urban areas due to existing widespread licensing of point-to-point and point-to-multipoint microwave links in the downlink portion of the Ka-band (i.e., 17.7-20.2 GHz).<sup>12</sup>

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<sup>10</sup> Comments of Hughes at 3.

<sup>11</sup> The other main proponent of LMDS, Video/Phone Systems, Inc. ignores the issue of sharing between the FSS and LMDS entirely.

<sup>12</sup> Comments of Suite 12 at 16-18.

Contrary to Suite 12's claims, the FSS will be able to use Ka-band downlink frequencies through standard coordination methods. Suite 12 compares the sharing situation at Ka-band to the situation at C-band where sharing between earth stations and fixed service stations is accomplished through geographical separation, antenna off-axis discrimination and frequency separation. Because of the proliferation of C-band fixed microwave service and fixed satellite earth stations over the last 25 years, C-band is today nearing saturation. However, coordination of new earth stations, while difficult, is still possible. New C-band earth stations can still be located in urban areas, including on roof tops in Manhattan. The ability to successfully share C-band between satellite and fixed terrestrial services is proof positive that coordination between earth stations and a dense population of point-to-point terrestrial microwave stations is feasible. Joint use of C-band by conventional terrestrial and space services is a success story in efficient use of a scarce resource. The proposed LMDS is, of course, not a conventional, point-to-point fixed service.

At Ka-band, coordination will be easier to achieve than at C-band due to the use of higher gain antennas by both the fixed service and the fixed-satellite service, to propagation characteristics and to the much lower density of fixed stations as compared to C-band (In 1991, the number of fixed service links at Ka-band was roughly 25% of those at C-band and the bandwidth at Ka-band is more than twice that at C-band). The feasibility of coordination between earth stations and fixed stations has been proven over the years in various shared frequency bands. There is no question that these same approaches will lead to successful coordinations in the 17.7 - 19.7 GHz band.

Suite 12, in arguing that ACTS should not receive protection from interference from LMDS licensees, attributes the ACTS Certification of Frequency Support as stating that NASA's system design and choice of frequencies could result in intolerable interference into ACTS earth stations from terrestrial stations<sup>13</sup>. In fact, the Certification makes no mention of "intolerable interference". It does contain recommendations that :

- "2. NASA take steps to ensue compatibility of the ACTS network by:
- ...
- Developing frequency-sharing techniques between the ACTS system and future non-Government terrestrial systems in the 30/20 GHz bands
- ...
3. NTIA pursue final arrangements with the FCC for a protected status for the ACTS satellite and its associated stationary earth stations."

In addition, one of the source documents for the Certification concludes: "The ACTS transmitting and receiving earth stations must be coordinated with existing and planned non-government terrestrial operations in the bands 18.8 - 19.7 and 27.5 - 29.5 GHz."<sup>14</sup>

The sharing situation described by these conclusions and recommendations is not difficult or unique and is considerably different from the dismal inferences inexplicably made by Suite 12 from these same documents.

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<sup>13</sup> Comments of Suite 12 at 34

<sup>14</sup> Conclusion 9 from NTIA memorandum from Gordon Crandall to Chairman, SPS (January 13, 1993)



It should be noted that Working Group 3 of the NRC studied this issue. As regards point-to-multipoint systems, Working Group 3 concluded that coordination is indeed possible because "[a]lthough the location of the [receive] sites are not known to the FCC, no doubt they are known to the system owners."<sup>15</sup> Further, as regards point-to-point microwave systems, Working Group 3 concluded:

Given the low power, short path lengths, and the narrow beams of these systems, it would seem quite possible to find a suitable location for a LEO Earth Station in or near the

network used by a supermarket chain may have many sites in a given metropolitan area, one used by a brokerage firm may have only one or two in a given area. Furthermore, the decision to use a Ka-band VSAT network will in most cases be determined by operational considerations, not by the complexity of the licensing process.

Second, even at C-band, where every earth station must be

initially coordinated, the FCC has a policy that allows "contingent"

intended to provide complete operational service. There are several new technology packages on-board the spacecraft, and the amount of traffic that any individual configuration can accommodate is less than that which would be provided by an operational commercial spacecraft. For example, antenna coverage is provided only to a part of the U.S., and there are a limited number of channels for experiments.

Moreover, the ACTS design uses an offset between downlink and uplink of 9.72 GHz. Because the spacecraft has a baseband processing experiment package that uses a higher data rate on the downlink than that used on the uplink, however, the offset applies to the difference between a group of uplink frequencies and the corresponding downlink frequency. Thus, what may appear as "orphaned" unpaired spectrum because only a partial set of uplink and downlink frequencies will be used by ACTS would not exist on a commercial satellite that uses the technologies developed by ACTS.

VI. The Comments Show that the Proposed LMDS Allocation Would Have a Severe and Far-Reaching Impact on the Satellite Industry

NASA explained in its initial comments that the proposed co-primary allocation would, in practice, be a de facto reallocation from the FSS to LMDS of the 27.5-29.5 GHz band, as well as of the corresponding portion of the downlink band at 17.7-19.7 GHz. NASA went on to explain that this result would have a number of negative consequences from a public interest standpoint.<sup>20</sup>

The same concerns were expressed by the other satellite interests who filed comments. For example, Calling Communications noted that

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<sup>20</sup> Comments of NASA at 25-28.

"the proposed regulatory structure for LMDS set forth in the Notice would have the practical effect of relegating FSS in the 27.5-29.5 GHz band to 'secondary' status to LMDS."<sup>21</sup> Both Calling Communications and Hughes also noted that the utility of the 17.7-19.7 GHz downlink band would be threatened by the proposed LMDS allocation.<sup>22</sup> Motorola SatCom indicated that the proposed allocation of 2000 MHz to LMDS would jeopardize the IRIDIUM system's gateway and satellite control stations which would operate in the 29.1-29.3 GHz band.<sup>23</sup>

NASA noted in its comments that "[i]f LMDS is allowed to halt the development of [Ka-band satellite] technology in the U.S. just when major strides are about to be made through the launching of ACTS, then, for virtually the first time, the U.S. will be abdicating its leadership position in a segment of the satellite industry."<sup>24</sup> In this same vein, LQSS observed:

One of the industrial sectors in which the United States continues to maintain world leadership is commercial space. The country's pre-eminence in the design, development and production of spacecraft, launch vehicles, earth stations, and continuous innovation in new communications services such as VSAT networks, satellite news-gathering, distance learning, videoconferencing and satellite business television must be maintained and supported.<sup>25</sup>

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<sup>21</sup> Comments of Calling Communications at 8.

<sup>22</sup> Comments of Calling Communications at 8; Comments of Hughes at 2.

<sup>23</sup> Comments of Motorola SatCom at 8-10.

<sup>24</sup> Comments of NASA at 26.

<sup>25</sup> Comments of LQSS at 3.

Finally NASA agrees with LOSS that the Commission must carefully

reassignment scheme may be premature and overly generous. It is not supported by the record."<sup>29</sup>

Finally, The Wireless Cable Association International, Inc. states:

While LMDS could prove a godsend to the wireless cable industry, WCA nonetheless urges the Commission to proceed with caution before adopting rules to govern use of the 28 GHz band for point-to-multipoint video distribution and accompanying voice and data services. Put bluntly, WCA is troubled by Suite 12's aversion to providing the Commission and the public with an opportunity to scrutinize field data that would establish the technological capabilities and limitation of 28 GHz technology. The paucity of hard data in the record makes it difficult for WCA to draw any conclusions as to whether the 28 GHz band should be reallocated for LMDS, much less develop firm opinions as to what licensing and technical rules would best govern the LMDS.<sup>30</sup>

VIII. LMDS Can Be Accommodated in Spectrum Other than the 27.5-29.5 GHz Band If More Spectrum Efficient Technology Is Employed

which Suite 12 Group claims is necessary for a viable system<sup>31</sup> if LMDS operators use currently available digital compression technology.

Specifically, NASA believes that even the number of channels that Suite 12 Group claims LMDS systems will need could be provided in 500 MHz of spectrum or less.<sup>32</sup> Using currently available digital compression technologies,<sup>33</sup> at least 75 NTSC quality video program channels can be provided in a 500 MHz allocation, or three times the number of channels that can be provided using analog FM transmission. Thus, if the 500 MHz were divided between two operators, they would be able to offer on the order of 40 channels each.<sup>34</sup>

Indeed, this is a conservative estimate because digital compression technologies can allow significantly more than three times the number of video channels in the same bandwidth as a single FM video signal. In early 1994, Hughes Communications is scheduled to launch a direct broadcast satellite television service ("DirecTV") which will provide 4 - 8 NTSC

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<sup>31</sup> Suite 12 Group has indicated a need for 20 MHz per channel to support video distribution using analog FM transmission. With a 1000 MHz allocation, Suite 12 Group claims it could provide subscribers with approximately 48 video channels of programming, a degree of programming diversity which it states would rival that provided by cable.

<sup>32</sup> Motorola Inc. notes that "[i]t is possible that, in the future, additional alternative modulation technologies will permit some of these services to be implemented within a 250 MHz bandwidth, thereby allowing the cellular-like operation contemplated in the NPRM, to be offered using 500 MHz of spectrum." Comments of Motorola Inc. at 7.

<sup>33</sup> Suite 12 Group has indicated its intent to migrate to digital compression technology. See Sarnoff Report, attached to Suite 12 Group Petition for Rulemaking.

<sup>34</sup> Even if it is determined that 500 MHz is not enough to support two licensees, the entire 500 MHz could be assigned to one licensee in a given market. A duopoly licensing scheme is not necessary to ensure competition because, as noted above, LMDS providers would face formidable competition from existing and future video service providers.

video signals per 24 MHz bandwidth transponder using digital compression technology being developed by David Sarnoff Research Labs. At four channels per transponder the quality is reported to be equivalent to NTSC quality and at eight channels per transponder, the quality is reported to be comparable to VCR quality. The satellite direct-to-home distribution service will provide approximately 150 video channels in the 500 MHz Ku-band DBS allocation. Introduction of the Hughes "DirecTV" service will greatly reduce the cost of video decompression hardware and will be available within the next twelve months.

Finally, to the extent that LMDS systems wish to provide high definition television-quality programming, advanced modulation techniques, such as higher-order Quadrature Amplitude Modulation (QAM), will make this possible without reducing the number of channels that can be provided in 500 MHz of bandwidth.<sup>35</sup>

#### IX. Conclusion

For the reasons set forth in our Comments and Reply Comments, the Commission should defer for five years a decision on whether to allocate spectrum in the 27.5-29.5 GHz band for LMDS so that it can properly weigh the impact on the Fixed Satellite Service in light of the results of the ACTS experiments. This band has long been viewed as the expansion band for the FSS and to take action that would effectively relegate the FSS to

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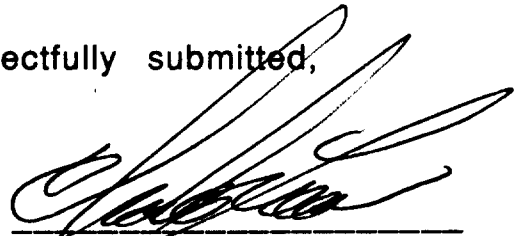
<sup>35</sup> In this connection, four of the five HDTV video systems under comparative evaluation by the FCC's Advisory Committee on Advanced Television (whose purpose is to recommend a terrestrial HDTV transmission standard) are digital systems. In each of these systems the video, audio and ancillary data signals are compressed to approximately 20-25 Mbps and transmitted with a bandwidth efficient modulation scheme (typically 16 to 32 QAM). The resultant transmission bandwidth is only 6 MHz for an HDTV signal. Thus, LMDS operators would be able to provide on the order of 80 channels in a 500 MHz allocation.



secondary status at a time when satellite use of the band is beginning to emerge not only would jeopardize the American people's nearly \$1 billion investment in the ACTS program, it would threaten the future viability of the FSS in the U.S. as well as the continued world leadership position of the U.S. in the satellite industry. If the Commission decides that spectrum should be allocated to LMDS now, then it should require that currently available digital compression technology be employed in order to reduce the spectrum requirements of LMDS and, thereby, facilitate the identification of alternative spectrum for this service.

Respectfully submitted,

By:



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April 15, 1993